EXHIBIT 28

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Jae Hyun HWANG, et al.	Conf. No.:	9013
Application No.:	14/302,052	Examiner:	Sai Ming CHAN
Filing Date:	June 11, 2014	Art Unit:	2462
Title:	SOFTWARE DEFINED NETWORKING BASED CONGESTION CONTROL		
Atty. Dkt. No.:	29250-002735-US		

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March 30, 2016

AMENDMENT UNDER 37 C.F.R. §1.111

Sir:

In response to the non-final Office Action mailed January 12, 2016, the following amendments and remarks are respectfully submitted in connection with the above-identified application.

Amendments to the Claims begin on page 2,
Remarks begin on page 13 of this Amendment.

	Claims remaining after		**Highest number previously paid for**		**Present extra**
Total	20	-	20	=	0
Independent	4	-	4	=	0

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1. (Currently Amended) A method of adjusting bandwidth allocation by a network switching element in a communications network, the network switching element including a target port, the method comprising:

monitoring, by the network switching element, a data flow traversing the target port of the network switching element;

determining, by the network switching element, a bandwidth allocation for the target port, the bandwidth allocation for the target port being a bandwidth that is currently allocated for the data flow;

determining, by the network switching element, a fair-share bandwidth allocation for the target port, the fair-share bandwidth allocation being a proportional allocation of a total bandwidth of the network switching element; and

adjusting, by the network switching element, the bandwidth allocation for the target port based on the fair-share bandwidth allocation.

2. (Currently Amended) The method of claim 1, wherein the network switching element includes a plurality of ports, the plurality of ports including the target port, and each of the plurality of ports is assigned a corresponding bandwidth allocation, and the determining the fair-share bandwidth allocation comprises:

determining a weight value for each of the plurality of ports of the network switching element;

determining a total weight value based on the weight value of each of the plurality of ports; and

determining the fair-share bandwidth allocation for the target port based on the weight value of the target port and the total weight value.

3. (Original) The method of claim 2, wherein the monitoring comprises:

receiving a data packet associated with the data flow;

determining whether the received data packet is one of a flow termination packet and a flow initiation packet;

increasing the total weight value by the weight of the target port if the received data packet is a flow initiation packet; and

decreasing the total weight value by the weight of the target port if the received data packet is a flow termination packet.

4. (Original) The method of claim 2, wherein the determining the bandwidth allocation for the target port comprises:

determining a link capacity for the target port, the link capacity being a highest amount of bandwidth that may be allocated to the target port;

determining a round trip time (RTT) associated with the data flow; and

determining the bandwidth allocation for the target port by multiplying the link capacity by the RTT.

5. (Original) The method of claim 4, wherein the determining the fair-share bandwidth allocation further comprises:

determining a fair-share weight value by dividing the weight value of the target port by the total weight value; and

determining a weighted fair-share bandwidth allocation by multiplying the fair-share weight value by the bandwidth allocation for the target port.

6. (Original) The method of claim 2, wherein the monitoring comprises:

defining a time out value for a timer, the timer being associated with the bandwidth allocation for the target port; and

determining that a timeout event has occurred with respect to the data flow based on expiration of the timer.

7. (Original) The method of claim 6, wherein the monitoring further comprises:

receiving a data packet associated with the data flow;

resetting the timer to be equal to the timeout value if the timeout event does not occur before the data packet is received; and

decreasing the total weight by the weight of the target port if the timeout event does occur before the data packet is received.

8. (Original) The method of claim 7, wherein the monitoring further comprises:

increasing the total weight by the weight of the target port when a subsequent data packet is received after the timeout event occurs.

9. (Original) The method of claim 8, wherein the monitoring further comprises:

determining a timeout fraction based on a number of times that the total weight is increased by the weight of the target port when the subsequent data packet is received after the timeout event occurs;

determining a target fraction based on the timeout fraction; and

adjusting the timeout value based on the target fraction.

10. (Original) The method of claim 6, wherein the timeout value is based on a desired minimum timeout value and a desired maximum timeout value, and the desired minimum timeout value is larger than a round trip time (RTT) associated with the data flow.

11. (Currently Amended) A method of adjusting bandwidth allocation by a network controller in a communications network, the network controller being configured to control a network switching element, the network switching element including a target port, the method comprising:

receiving, by the network controller, data flow information from the network switching element, the data flow information including information about data flows traversing of the target port of the network switching element;

determining, by the network controller, a bandwidth allocation of the target port based on the data flow information, the bandwidth allocation of the target port being a bandwidth that is currently allocated for each of the data flows traversing the target port;

determining, by the network controller, an over-subscription ratio, the over-subscription ratio being a ratio of the bandwidth allocation of the target port to a number of data flows traversing the target port;

transmitting, by the network controller, the over-subscription ratio to the network switching element based on the over-subscription ratio and a threshold value;

determining, by the network controller, a fair-share bandwidth allocation for the target port based on the over-subscription ratio and the threshold value, the fair-share bandwidth allocation being a proportional allocation of a total bandwidth of the network switching element; and

adjusting, by the network controller, the bandwidth allocation for the target port based on the fair-share bandwidth allocation.

12. (Currently Amended) The method of claim 11, wherein the network switching element includes a plurality of ports, the plurality of ports including the target port, and each of the plurality of ports is assigned a corresponding bandwidth allocation, and the determining the fair-share bandwidth allocation for the target port comprises:

determining the bandwidth allocation for each of the plurality of ports of the network switching element;

determining a weight value for each of the plurality of ports;

determining a total weight value based on the weight value for each of the plurality of ports; and

determining the fair-share bandwidth allocation for the target port based on the weight value of the target port and the total weight value.

13. (Original) The method of claim 12, wherein the determining the bandwidth allocation for each of the plurality of ports comprises:

determining a link capacity for the target port, the link capacity being a highest amount of bandwidth that is able to be allocated to of the target port;

determining a round trip time (RTT) for one of the data flows traversing the target port; and

determining the bandwidth allocation for the target port by multiplying the link capacity by the RTT.

14. (Original) The method of claim 13, wherein the determining the fair-share bandwidth allocation for the target port comprises:

determining a fair-share weight value by dividing the weight value of the target port by the total weight value; and

determining a network fair-share bandwidth allocation by multiplying the fair-share weight value by the bandwidth allocation of the target port.

15. (Currently Amended) The method of claim 14, wherein the network switching element is associated with a secondary network switching_element, the secondary network switching_element including a secondary set of ports, and the secondary network switching_element determines a weighted fair-share bandwidth allocation for each of the secondary set of ports.

16. (Original) The method of claim 15, wherein the adjusting the bandwidth allocation for the target port comprises:

determining a data flow traversing the target port and a secondary target port, the secondary target port being one of secondary set of ports;

determining the weighted fair-share bandwidth allocation for the data flow traversing the target port and the secondary target port;

determining the network fair-share bandwidth allocation for the data flow traversing the target port and the secondary target port;

adjusting the bandwidth allocation for the target port based on the weighted fair-share bandwidth allocation when the weighted fair-share bandwidth allocation is less than the network fair-share bandwidth allocation; and

adjusting the bandwidth allocation for the target port based on the network fair-share bandwidth allocation when the network fair-share bandwidth allocation is less than the weighted fair-share bandwidth allocation.

17. (Currently Amended) An edge switch for adjusting bandwidth allocation in a communications network, the edge switch including a target port, the edge switch configured to:

monitor a data flow traversing the target port;

determine a bandwidth allocation for the target port, the bandwidth allocation for the target port being a bandwidth that is currently allocated for the data flow;

determine a fair-share bandwidth allocation for the target port, the fair-share bandwidth allocation being a proportional allocation of a total bandwidth of the network switching element; and

adjust the bandwidth allocation for the target port based on the fair-share bandwidth allocation.

18. (Currently Amended) The edge switch of claim 17, wherein the edge switch includes a plurality of ports, the plurality of ports including the target port, and each of the plurality of ports is assigned a corresponding bandwidth allocation, and in the determining the fair-share bandwidth allocation, the edge switch is configured to:

determine a weight value for each of the plurality of ports of the network switching element;

determine a total weight value based on the weight value of each of the plurality of ports; and

determine the fair-share bandwidth allocation based on the weight value for the target port and the total weight value.

19. (Original) The edge switch of claim 18, wherein, in the determining the bandwidth allocation for the target port, the edge switch is configured to:

determine a link capacity for the target port, the link capacity being a highest amount of bandwidth that is able to be allocated to the target port;

determine a round trip time (RTT) associated with the data flow;

determine the bandwidth allocation for the target port by multiplying the link capacity by the RTT;

determine a fair-share weight value by dividing the weight value for the target port by the total weight value; and

determine a weighted fair-share bandwidth allocation by multiplying the fair-share weight value by the bandwidth allocation for the target port.

20. (Currently Amended) A Software Defined Networking (SDN) controller for adjusting bandwidth allocation in a communications network, the SDN controller being configured to control an aggregation switch, the aggregation switch including a target port, the SDN controller is configured to:

receive data flow information from the network switching element, the data flow information including information about data flows traversing of the target port;

determine a bandwidth allocation of the target port based on the data flow information, the bandwidth allocation of the target port being a bandwidth that is currently allocated for each of the data flows traversing the target port;

determine an over-subscription ratio, the over-subscription ratio being a ratio of the bandwidth allocation of the target port to a number of data flows traversing the target port; and

transmit the over-subscription ratio to the aggregation switch based on the over-subscription ratio and a threshold value;

determine a fair-share bandwidth allocation for the target port based on the over-subscription ratio and the threshold value, the fair-share bandwidth allocation being a proportional allocation of a total bandwidth of the network switching element; and

adjust the bandwidth allocation for the target port based on the fair-share bandwidth allocation.

REMARKS

Claims 1-20 are pending in this application. Claims 1, 11, 17 and 20 are the independent claims. Claims 1, 2, 11, 12, 15, 17, 18 and 20 are amended. Reconsideration and allowance of the present application is respectfully requested.

Applicant appreciates the Examiner's acknowledgement and consideration of the drawings filed June 11, 2014.

Rejections under 35 U.S.C. §102 – *Ma*

Claims 1 and 17 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent 8,949,444 to Ma et al. ("Ma"). This rejection is respectfully traversed.

With regard to claim 1, Ma teaches a flow control scheme that takes place at a proxy device 120. Specifically, the proxy device 120 monitors round trip times (RTT) of acknowledgement messages (ACKs) for data flows leaving source ports (associated with user device 110) and arriving at destination ports (associated with resource 130), in order to allow the proxy device to reallocate data flows to the appropriate source / destination ports. Based on this understanding, Ma does not teach "monitoring, by the network switching element, a data flow *traversing* the target port of the switching element" (as recited in claim 1). That is to say, Ma does not monitor data traveling through a "target port" of the proxy device 120, itself. Instead, Ma only monitors data flows from ports that are at the user device 110 or the resource 130, where the user device 110 and resource 130 are not a "network switching element" (as recited in claim 1).

Furthermore, Ma does not teach regulating a bandwidth for a port at the proxy device 120. Rather, as described in col. 9, l. 3-24 (relied upon by the Examiner), Ma

teaches regulating data flow for bandwidth allocation of ports at the user device 110 and resource 130 (i.e., at a source and destination of the data flow). For this reason, Ma does not teach "determining, by the network switching element, a bandwidth allocation for the **target port**, the bandwidth allocation for the target port being a bandwidth that is currently allocated for the data flow," "determining, by the network switching element, a fair-share bandwidth allocation for the **target port**, the fair-share bandwidth allocation being a proportional allocation of a total bandwidth of the network element" and "adjusting, by the network switching element, the bandwidth allocation for the **target port** based on the fair-share bandwidth allocation" (as recited in claim 1). For these reasons, Ma does not teach all of the limitations of claim 1.

With regard to independent claim 17, Applicant asserts that this claim contains features similar to claim 1, such that at least the same arguments can be made.

For at least the reasons argued above, Applicant asserts that independent claims 1 and 17 are patentable. Therefore, Applicant respectfully requests that this art ground of rejection of these claims under 35 U.S.C. §102 be withdrawn.

Rejections under 35 U.S.C. §103 – *Ma in view of various combinations of Excell and Matthews*

Claims 2, 6, 18 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Ma in view of various combinations of U.S. Patent 6,714,555 to Excell et al. ("Excell") and U.S. Patent Publication 2012/0195192 to Matthews et al. ("Matthews"). This rejection is respectfully traversed.

Excell and Matthews do not remedy the deficiencies of Ma, with regard to claims 1 and 17, nor does the Examiner make such an assertion. Therefore, claims 1

and 17 are patentable over any combination of Ma, Excell and Matthews. Due at least to the dependence of the remaining claims on respective claims 1 and 17, Applicant asserts that the remaining claims are also patentable. Therefore, Applicant respectfully requests that this art ground of rejection of these claims under 35 U.S.C. §103 be withdrawn.

Allowable Subject Matter

Applicant notes with appreciation the Examiner's indication that claims 11-16 and 20 are allowed, and claims 3-5, 7-10 and 19 contain allowable subject matter. However, Applicant asserts that all of the pending claims are patentable, for at least the reasons argued above.

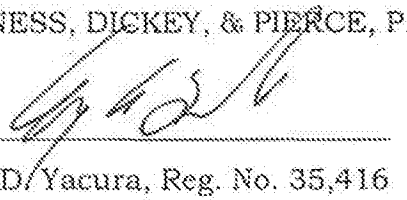
CONCLUSION

In view of the above remarks and amendments, Applicant respectfully submits that each of the rejections has been addressed and overcome, placing the present application in condition for allowance. A notice to that effect is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to contact the undersigned.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned at the telephone number below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,
HARNESS, DICKEY, & PIERCE, P.L.C.

By 

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